

WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

a first semiconductor layer and a second semiconductor layer on an insulating surface;

5 a first insulating film on the first semiconductor layer and on the second semiconductor layer;

a gate wiring on the first insulating film, overlapping the first semiconductor layer;

10 a capacitor wiring on the first insulating film, positioned over the second semiconductor layer;

an island shape source wiring on the first insulating film;

a second insulating film covering the gate wiring, the capacitor wiring, and the island shape source wiring;

15 a connection electrode on the second insulating film, connected to the island shape source wiring and the first semiconductor layer; and

a pixel electrode on the second insulating film, connected to the first semiconductor layer;

wherein the pixel electrode overlaps the island shape source wiring with the second insulating film interposed therebetween.

20 2. A device according to claim 1, wherein:

a plurality of the island shape source wirings are arranged in each pixel;

and

25 the island shape source wirings are each connected to the connection electrodes.

3. A device according to claim 1, wherein the pixel electrode overlaps the gate wiring with the second insulating film interposed therebetween.

4. A device according to claim 1, wherein the gate wiring is formed from a film having an element selected from the group consisting of: polysilicon doped with an impurity element which imparts one conductivity; W; WSix; Al; Cu; Ta; Cr; and Mo as its main constituent, and a lamination film of the elements.

5. A device according to claim 1, wherein the second insulating film is composed of a first insulating layer having silicon as its main constituent, and a second insulating layer comprises an organic resin material.

6. A device according to claim 1, wherein the semiconductor device is a reflecting type liquid crystal display device.

7. A device according to claim 1, wherein the semiconductor device is a device selected from the group consisting of a personal computer, a video camera, a portable information terminal, a digital camera, a digital video disk player, and an electronic amusement device.

8. A semiconductor device comprising a first substrate, a second substrate, and a liquid crystal maintained between the joined first substrate and second substrate, wherein:

a pixel portion having a thin film transistor, and a driver circuit having a thin film transistor are formed on the first substrate;

the pixel portion has a semiconductor layer, a first insulating film covering the semiconductor layer, wirings on the first insulating film, a second insulating film covering the wirings, and electrodes on the second insulating film;

a red color filter, a blue color filter, and a green color filter corresponding to each pixel of the pixel portion are formed on the second substrate; and

a lamination film of the red color filter and the blue color filter on the second substrate becomes a light shielding film overlapping the thin film transistor on the first substrate.

9. A device according to claim 8, wherein the wirings are a gate wiring, an island shape source wiring, and a capacitor wiring.

10. A device according to claim 9, wherein a storage capacitor having the first insulating film as a dielectric is formed in a region in which the capacitor wiring and the semiconductor layer overlap, sandwiching the first insulating film therebetween.

11. A device according to claim 9, wherein the electrodes are a pixel electrode connected to the semiconductor layer, and a connection electrode connected to the island shape source wiring.

12. A device according to claim 8, wherein a gap between the first substrate and the second substrate is maintained by a spacer composed of a lamination film of the red color filter, the blue color filter, and the green color filter.

13. A device according to claim 9, wherein the gate wiring is formed from a film

having an element selected from the group consisting of: polysilicon doped with an impurity element which imparts one conductivity; W; WSix; Al; Cu; Ta; Cr; and Mo as its main constituent, and a lamination film of the elements.

5 14. A device according to claim 8, wherein the second insulating film is composed of a first insulating layer having silicon as its main constituent, and a second insulating layer comprising an organic resin material.

10 15. A device according to claim 8, wherein the semiconductor device is a reflecting type liquid crystal display device.

15 16. A device according to claim 8, wherein the semiconductor device is a device selected from the group consisting of a personal computer, a video camera, a portable information terminal, a digital camera, a digital video disk player, and an electronic amusement device.

17. A semiconductor device comprising:

Sub
a1
a first semiconductor layer and a second semiconductor layer on an insulating surface;

20 a first insulating film on the first semiconductor layer and on the second semiconductor layer;

a first electrode on the first insulating film, overlapping the first semiconductor layer;

25 a second electrode on the first insulating film, overlapping the second semiconductor layer;

a source wiring on the first insulating film;

a second insulating film covering the first electrode and the source wiring;

a gate wiring on the second insulating film, connected to the first electrode;

a connection electrode on the second insulating film, connected to the source wiring and the first semiconductor layer; and

a pixel electrode on the second insulating film, connected to the first semiconductor layer;

wherein the pixel electrode overlays the source wiring with the second insulating film interposed therebetween.

18. A device according to claim 17, wherein the first electrode overlapping the first semiconductor layer is a gate electrode.

19. A device according to claim 17, wherein a storage capacitor is formed by the second semiconductor layer connected to the pixel electrode, and the second electrode connected to a gate wiring of an adjacent pixel, with the first insulating film as a dielectric.

20. A device according to claim 17, wherein:

the first semiconductor layer contains an impurity element which imparts one conductivity into the semiconductor; and

the second semiconductor layer contains an impurity element which imparts one conductivity, opposite to that contained in the first semiconductor layer, into the

semiconductor.

5 *Sub* 21. A device according to claim 17, wherein the gate wiring is formed from a film having an element selected from the group consisting of: polysilicon doped with an impurity element which imparts one conductivity; W; WSix; Al; Cu; Ta; Cr; and Mo as its main constituent, and a lamination film of the elements.

10 22. A device according to claim 17, wherein the second insulating film is composed of a first insulating layer having silicon as its main constituent, and a second insulating layer comprising an organic resin material.

23. A device according to claim 17, wherein the semiconductor device is a reflecting type liquid crystal display device.

15 24. A device according to claim 17, wherein the semiconductor device is a device selected from the group consisting of a personal computer, a video camera, a portable information terminal, a digital camera, a digital video disk player, and an electronic amusement device.

20 25. A semiconductor device comprising TFT, containing a semiconductor layer formed on an insulating surface, an insulating film formed on the semiconductor layer, and a gate electrode formed on the insulating film, wherein:

25 the gate electrode has a first conductive layer with a tapered shape edge portion as a lower layer, and a second conductive layer having a narrower width than that of the first conductive layer as an upper layer; and

the semiconductor layer includes: a channel forming region overlapping the second conductive layer, sandwiching the insulating film therebetween; a third impurity region formed contacting the channel forming region; a second impurity region formed contacting the third impurity region; and a first impurity region formed contacting the second impurity region.

26. A device according to claim 25, wherein the third impurity region overlaps the first conductive layer with the insulating film interposed therebetween.

27. A device according to claim 25, wherein the first impurity region is a source region or a drain region.

28. A device according to claim 25, wherein a region of the insulating film which overlaps with the second impurity region contains a portion having a tapered shape.

29. A device according to claim 25, wherein the TFT is an n-channel TFT.

30. A device according to claim 25, wherein the TFT is a p-channel TFT.

31. A device according to claim 25, wherein the semiconductor device is a reflecting type liquid crystal display device.

32. A device according to claim 25, wherein the semiconductor device is a device selected from the group consisting of a personal computer, a video camera, a portable information terminal, a digital camera, a digital video disk player, and an electronic

amusement device.

33. A method of manufacturing a semiconductor device, comprising steps of:

forming a first semiconductor layer and a second semiconductor layer, made
5 of crystalline semiconductor films, on an insulating surface;

forming a first insulating film on the first semiconductor layer and on the
second semiconductor layer;

forming a gate wiring on the first insulating film, overlapping the first
semiconductor layer; a capacitor wiring on the first insulating film, positioned over the
10 second semiconductor layer; and an island shape source wiring on the first insulating
film;

forming a second insulating film covering the gate wiring, the capacitor
wiring, and the island shape source wiring; and

forming a connection electrode on the second insulating film, connected to
15 the island shape source wiring and to the first semiconductor layer; and a pixel
electrode overlapping the island shape source wiring.

34. A method according to claim 33, wherein the second insulating film is
composed of a lamination film of: a first insulating layer having silicon as a
20 constituent; and a second insulating layer made from an organic resin material.

35. A method according to claim 33, wherein the second insulating film is
composed of a lamination film of: a first insulating layer made from silicon oxide,
silicon nitride, or silicon nitride oxide; and a second insulating layer made from
25 polyimide, acrylic, polyamide, polyimide amide, or benzocyclobutene.

36. A method of manufacturing a semiconductor device having a liquid crystal sandwiched between a pair of substrates, comprising steps of:

forming a first semiconductor layer and a second semiconductor layer, made of crystalline semiconductor films, on a first substrate;

5 forming a first insulating film on the first semiconductor layer and on the second semiconductor layer;

forming a gate wiring on the first insulating film, overlapping the first semiconductor layer; a capacitor wiring on the first insulating film, positioned over the second semiconductor layer; and an island shape source wiring on the first insulating film;

forming a second insulating film covering the gate wiring, the capacitor wiring, and the island shape source wiring;

forming: a connection electrode on the second insulating film, connected to the island shape source wiring and to the first semiconductor layer; and a pixel electrode overlapping the island shape source wiring;

forming, on the second substrate, a red color filter, a blue color filter, and a green color filter corresponding to each pixel electrode, and for simultaneously forming a light shielding film, composed of a lamination film of the red color filter and the blue color filter, so as to overlap with at least the first semiconductor layer; and

20 bonding the first substrate to the second substrate.

37 A method according to claim 36, wherein the second insulating film is composed of a lamination film of: a first insulating layer having silicon as a constituent; and a second insulating layer made from an organic resin material.

09769765-012601

38. A method according to claim 36, wherein the second insulating film is composed of a lamination film of: a first insulating layer made from silicon oxide, silicon nitride, or silicon nitride oxide; and a second insulating layer made from polyimide, acrylic, polyamide, polyimide amide, or benzocyclobutene.

39. A method of manufacturing a semiconductor device, comprising steps of:
forming a first semiconductor layer and a second semiconductor layer, made of crystalline semiconductor films, on an insulating surface,

forming a first insulating film on the first semiconductor layer and on the second semiconductor layer;

forming, on the first insulating film: a first electrode overlapping the first semiconductor layer; a second electrode overlapping the second semiconductor layer; and a source wiring;

forming a second insulating film covering the first electrode, the second electrode, and the source wiring; and

forming, on the second insulating film: a gate wiring connected to the first electrode; a connection electrode connected to the first semiconductor layer and to the source wiring; and a pixel electrode overlapping the source wiring.

40. A method according to claim 39, wherein the second semiconductor layer connected to the pixel electrode overlaps the second electrode connected to a gate wiring of an adjacent pixel, sandwiching the first insulating film therebetween.

41. A method according to claim 39, wherein the second insulating film is composed of a lamination film of: a first insulating layer having silicon as a

constituent; and a second insulating layer made from an organic resin material.

42. A method according to claim 39, wherein the second insulating film is composed of a lamination film of: a first insulating layer made from silicon oxide, silicon nitride, or silicon nitride oxide; and a second insulating layer made from polyimide, acrylic, polyamide, polyimide amide, or benzocyclobutene.

43. A method of manufacturing a semiconductor device having a liquid crystal sandwiched between a pair of substrates, comprising steps of:

forming a first semiconductor layer and a second semiconductor layer, made of crystalline semiconductor films, on a first substrate;

forming a first insulating film on the first semiconductor layer and on the second semiconductor layer;

forming, on the first insulating film: a first electrode overlapping the first semiconductor layer; a second electrode overlapping the second semiconductor layer; and a source wiring;

forming a second insulating film covering the first electrode, the second electrode, and the source wiring;

forming, on the second insulating film: a gate wiring connected to the first electrode; a connection electrode connected to the first semiconductor layer and to the source wiring; and a pixel electrode overlapping the source wiring;

forming, on the second substrate, a red color filter, a blue color filter, and a green color filter corresponding to each pixel electrode, and for simultaneously forming a light shielding film, composed of a lamination film of the red color filter and the blue color filter, so as to overlap with at least the first semiconductor layer; and

bonding the first substrate to the second substrate.

44. A method according to claim 43, wherein the second insulating film is composed of a lamination film of: a first insulating layer having silicon as a constituent; and a second insulating layer made from an organic resin material.

45. A method according to claim 43, wherein the second insulating film is composed of a lamination film of: a first insulating layer made from silicon oxide, silicon nitride, or silicon nitride oxide; and a second insulating layer made from polyimide, acrylic, polyamide, polyimide amide, or benzocyclobutene.

46. A method of manufacturing a semiconductor device, comprising the steps of:

forming a semiconductor layer on an insulating surface;

forming an insulating film on the semiconductor layer;

forming a first conductive layer and a second conductive layer on the insulating film;

adding an impurity element which imparts one conductivity, using the first conductive layer and the second conductive layer as a mask, forming a first impurity region;

etching the first conductive layer and the second conductive layer, forming a first conductive layer having a tapered portion and a second conductive layer having a tapered portion; and

adding an impurity element which imparts one conductivity into the semiconductor layer through the insulating film, forming a second impurity region, and

simultaneously adding an impurity element which imparts one conductivity into the semiconductor layer, through the tapered portion of the first conductive layer, forming a third impurity region in which the impurity concentration increases toward an edge portion of the semiconductor layer.

5

47. A method of manufacturing a semiconductor device, comprising the steps of:

forming a semiconductor layer on an insulating surface;

forming an insulating film on the semiconductor layer;

forming a first conductive layer and a second conductive layer on the insulating film;

adding an impurity element which imparts one conductivity, using the first conductive layer and the second conductive layer as a mask, forming a first impurity region;

etching the first conductive layer, the second conductive layer, and the insulating film, forming a first conductive layer having a tapered portion and a second conductive layer having a tapered portion, and an insulating film having a portion of the tapered portion; and

adding an impurity element which imparts one conductivity into the semiconductor layer, through the insulating film having a portion of the tapered portion, forming a second impurity region; and simultaneously adding an impurity element which imparts one conductivity into the semiconductor layer, through the tapered portion of the first conductive layer, forming a third impurity region in which the impurity concentration increases toward an edge portion of the semiconductor

25 layer.

09769765-012601

Add
a2